

Abstract

A system for performing molecular biological diagnosis, analysis and multistep and multiplex reactions utilizes a selfaddressable, selfassembling microelectronic system for actively carrying out controlled reactions in microscopic formats. Preferably, a fluidic system flow a sample across an active area of the biochip, increasing diagnostic efficiency. Preferably, the fluidic system includes a flow cell having a window.

10 Pulsed activation of the electrodes of the biochip are advantageously employed with the fluidic system, permitting more complete sampling of the materials within the biological sample. An improved detection system utilizes a preferably coaxially oriented excitation fiber, such as a fiber optic, disposed within a light guide, such as a liquid light guide. In this way, small geometry systems may be fluorescently imaged. A highly automated DNA diagnostic system results. Perturbation of the fluorescence signal during electronic denaturation 20 is detailed and analyzed for analytical and diagnostic purposes. Such fluorescence perturbation information is combined with other information to provide improved analysis. DNA fingerprinting uses hybridizing DNA fragments of a given length and a capture sequence at a test 25 site and then determining the level of reverse bias necessary to affect the hybridization, such as to dehybridize, and determine the length of the DNA.